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Indian Standard

SPECIFICATION FOR GALVANIZED STEEL WIRE STRAND FOR SIGNALLING PURPOSES

(First Revision)

Wire Ropes and Wire Products Sectional Committee, EDC 32; Wire Products (Other than Wire Ropes) Subcommittee, EDC 32 : 3 [Doc : Ref : EDC 32 (2679)]

1. Scope — Covers requirements for galvanized steel wire strand for signalling purposes.

2. Terminology — The terms given in IS : 2363-1965 ' Glossary of terms relating to wire ropes ' and the following shall apply.

2.1 *Bundle* — Shall mean two or more coils properly bound together.

2.2 *Coil* — Shall mean one length of wire or strand in the form of a coil having a mass of 50±2·5 kg.

2.3 *Piece* — Shall mean a length of wire without joint or splice of any description in the finished wire.

3. Dimensions

4. Material

4.1 The wire shall be manufactured from steel made by open hearth, electric duplex, basic-oxygen or a combination of these processes. In case any other process is employed by the manufacturer, prior approval of the purchaser should be obtained.

4.2 If so required, the manufacturer shall furnish the steel maker's cast analysis to the purchaser and issue a certificate to him that the wire has been drawn from the certified steel.

4.3 The steel used shall be plain carbon and shall not contain sulphur and phosphorus more than 0·050 percent each.

4.4 The wire shall be coated with zinc of Grade " Zn 98 " of IS : 209-1966 ' Specification for zinc (*second revision*) '.

4.5 The general requirements for the supply of materials to this standard shall be in accordance with IS : 1387-1967 ' General requirements for the supply of metallurgical materials (*first revision*) '.

5. Grades — The grade of a strand is the minimum tensile strength in N/mm² of the wires comprising the strand and shall be one of the following:

Grade	*Tensile Strength Range of Wire* N/mm²
800	800 to 1 000
950	950 to 1 150
1 100	1 100 to 1 300

6. Requirements

6.1 *Construction* — The wire strand shall consist of six cover wires and one core wire [1 × 7 (6/1)].

6.2 *Lay of Strand* — The wires shall be stranded in right-hand direction and the maximum length of lay shall be 70 mm.

6.3 *Galvanizing* — The galvanized coating of steel wire shall conform to the requirements in Table 1.

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TABLE 1 PHYSICAL PROPERTIES OF GALVANIZED STEEL WIRE STRAND FOR SIGNALLING PURPOSES

(*Clauses* 3, 6.3, 8.2, 8.3 *and* 8.5)

Grade	Requirements Before Stranding									Requirements After Stranding										
	Breaking Load of Wire				Maximum Elongation on a Gauge Length of 100 mm	Minimum Reverse Bends Over 5 mm Radius	Minimum Mass of Zinc g/m²		Number of Dips	Breaking Load of Wire				Maximum Elongation on a Gauge Length of 100 mm	Minimum Reverse Bends Over 5 mm Radius	Minimum Mass of Zinc g/m²		Number of Dips		Minimum Breaking Strength of Strand
	Cover Wire ±0·05 mm 1·40 mm		Core Wire ±0·05 mm 1·50 mm							Cover Wire ±0·05 mm 1·40 mm		Core Wire ±0·05 mm 1·50 mm								
	Min	*Max*	*Min*	*Max*			1·40 mm	1·50 mm	1 min duration	*Min*	*Max*	*Min*	*Max*			1·40 mm	1·50 mm	1 min duration	½ min duration	
	kN	kN	kN	kN	Percent					kN	kN	kN	kN	Percent						kN
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
800	1·25	1·58	1·44	1·81	7	15	180	190	2	1·17	1·58	1·35	1·81	7	11	171	181	1	1	8·5
950	1·50	1·83	1·72	2·09	7	15	180	190	2	1·42	1·83	1·63	2·09	7	11	171	181	1	1	10·2
1 110	1·75	2·08	2·00	2·39	7	15	180	190	2	1·67	2·08	1·91	2·39	7	11	171	181	1	1	11·9

6.4 *Mass* — The signalling wire strand shall be in the form of a coil of one length having a mass of 50 ± 2·5 kg.

7. Freedom from Defects

7.1 The wire shall be circular in section and free from scale, inequalities, splits and other defects. The zinc coating shall be smooth, even and bright.

7.2 Each length of wire shall be warranted to contain no weld, splice or joint whatsoever other than in the rod before it is finally drawn.

8. Tests

8.1 *Sampling*

8.1.1 *Sampling for chemical analysis* — Unless otherwise agreed to between the purchaser and the supplier, one test for chemical analysis shall be conducted for each lot or batch of coils manufactured from a particular cast or a group of casts at the option of the purchaser.

8.1.2 *Sampling for mechanical test* — Unless otherwise agreed to between the purchaser and the supplier, one sample shall be selected from each lot or batch of 20 coils or part thereof.

8.1.2.1 Samples for mechanical test shall be cut from one end, or both the ends in case of doubt, of the selected coils from each batch, of sufficient length for the test of the wire and also for the re-test, if required.

8.1.3 *Re-tests* — Should any one of the test pieces first selected fail to pass any of the tests specified, two further samples shall be selected for testing in respect of each failure. Should the test pieces from either of these additional samples fail, the material represented by the test samples shall be liable to rejection, as not conforming to this standard.

8.2 *Tensile Strength, Maximum Elongation and Breaking Load* — The material, when tested in accordance with IS : 1521-1972 'Method for tensile testing of steel wire', shall have the physical properties given in Table 1.

8.3 *Reverse Bend Test* — Test samples when tested in the manner described in IS : 1716-1971 'Method for reverse bend testing of steel wire (*first revision*)' shall withstand, without breaking or showing sign of splitting or other defects, the number of bends specified in Table 1.

8.4 *Wrapping Test of Steel* — This shall be conducted in accordance with IS : 1755-1961 'Method for wrapping test of wire'. The wire shall stand being wrapped eight times around its own diameter and subsequently unwrapped without showing signs of fracture.

8.5 *Coating Test* — The mass and uniformity of zinc coating shall be tested by the methods specified in IS : 4826-1968 'Galvanized coatings on round steel wires'.

8.6 The requirements pertaining to the adhesion of zinc coating shall conform to IS : 4826-1968.

9. Marking — Each coil shall be provided with a label fixed firmly on the inner part of the coil, bearing the following information:

a) Manufacturer's name or trade-mark,

b) Lot number and coil number,

c) A brief description and quality of the material,

d) Mass, and

e) Any other particular specified by the purchaser.

9.1 *ISI Certification Mark* — Details available with Indian Standards Institution.

10. Packing — Each coil shall be delivered securely bound with four separate binders of galvanized wire of size not less than 2·00 mm. The wire shall be smoothly and uniformly coiled so that the inner diameter of the coil shall be about half a metre. The coils shall then be wrapped individually in stout hessian or other suitable material. If required by the purchaser, the coils shall be suitably weather protected, by dipping three times in boiled linseed oil or by any other process, after having been bound, but before being covered with hessian or other suitable material and labelled.

EXPLANATORY NOTE

This standard was first issued in 1963. The experience gained in the implementation of this standard since its issue necessitated the present revision. Table 1 has been completely revised and requirements pertaining to minimum mass of zinc coating and number of dips before and after stranding have also been included in the table.

The grade numbers have been changed and the new grades 800, 900 and 1 110 correspond to 1, 2 and 3 respectively of 1963 version of the standard as for the minimum breaking loads are concerned. All the values have been given in SI units.

Galvanized steel wire strands are used in large quantities by the railways for signalling purposes. This is an item which is subjected to intermittent shock loadings as well as the corrosive action of the atmosphere. So the need was felt for maintaining a uniform level of quality in the wire as well as its anticorrosive coating. This standard is a step towards fulfilling this need.

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